

OHIO RIVER BASIN PRECIPITATION FREQUENCY PROJECT

Update of *Technical Paper No. 40, NWS HYDRO-35* and *Technical Paper No. 49*

Twenty-third Progress Report
1 April 2005 through 30 June 2005

Office of Hydrologic Development
U.S. National Weather Service
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DISCLAIMER

The data and information presented in this report are provided only to demonstrate current progress on the various technical tasks associated with this project. Values presented herein are NOT intended for any other use beyond the scope of this progress report. Anyone using any data or information presented in this report for any purpose other than for what it was intended does so at their own risk.

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1. Introduction

The final product for the Ohio River Basin and Surrounding States Precipitation Frequency Project, including documentation, is available as NOAA Atlas 14 Volume 2 "Precipitation Frequency Atlas of the United States." It is available on the Internet through the Precipitation frequency Data Server at <http://www.nws.noaa.gov/ohd/hdsc>. NOAA Atlas 14 Volume 2 includes estimates for Delaware, District of Columbia, Illinois, Indiana, Kentucky, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia.

The Hydrometeorological Design Studies Center (HDSC), Hydrology Laboratory, Office of Hydrologic Development, NOAA National Weather Service updated its precipitation frequency estimates for the Ohio River Basin and surrounding states. Previous precipitation frequency estimates for this area were contained in *Technical Paper No. 40* "Rainfall frequency atlas of the United States for durations from 30 minutes to 24 hours and return periods from 1 to 100 years" (Hershfield, 1961), *NWS HYDRO-35* "Five- to 60-minute precipitation frequency for the eastern and central United States" (Frederick et al., 1977) and *Technical Paper No. 49* "Two- to ten-day precipitation for return periods of 2 to 100 years in the contiguous United States" (Miller et al., 1964). The update included data collection and quality control, dataset formatting, regional frequency analyses, frequency distribution selection and fitting techniques, spatial interpolation and documentation.

The project determined all-season precipitation frequencies for durations from 5 minutes to 60 days, for average recurrence intervals from 2 to 1,000 years. For the project, HDSC reviewed and processed all generally available rainfall data for the project area and used accepted statistical methods. Documentation and project results are published as Volume 2 of NOAA Atlas 14 on the internet (<http://www.nws.noaa.gov/ohd/hdsc>) with the additional ability to download digital files.

2. Highlights

Hydrometeorological Design Studies Center (HDSC) released final documentation for NOAA Atlas 14 Volume 2.1 on June 3rd, 2005. A peer review of the documentation ended on March 17, 2005 and comments were addressed for the release of the final documentation. On June 15th, 2005, HDSC released the digital data used to generate all temporal distribution curves for heavy rainfall associated with NOAA Atlas 14 Volumes 1 and 2. Also, HDSC updated the format of the digitally-available time series data. These documents and data are available through links on the PFDS web-page at <http://hdsc.nws.noaa.gov/hdsc/pfds>. Additional information is provided in Section 3.1, Final Documentation.

The Precipitation Frequency Data Server (PFDS), the on-line portal for all NOAA Atlas 14 deliverables and information, underwent several changes. The most significant change was the posting of final documentation and temporal distribution data. Additional information is provided in Section 3.2, PFDS.

Progress on the development of areal reduction factors remains slow. Additional difficulties have been encountered in modifying the software to add the analysis of 30-minute and 48-hour durations. Two statistical procedures that will be used to test the differences between the ARF curves generated from the various sites have been applied to the data of two sites. Additional information is provided in Section 3.3, Areal Reduction Factors.

3. Progress in this Reporting Period

3.1 Final Documentation

A peer review period of the draft documentation for NOAA Atlas 14 Volume 2 precipitation frequency estimates for the Ohio River basin and surround states began February 17th, 2005 and concluded on March 17th, 2005. Reviewer comments were divided into four categories (format or typo's, clarification considerations, technical questions, and general comments) and addressed. Most comments were editorial in nature but a few may lead to procedural enhancements in future studies. The reviewer comments and responses may be found on-line at http://hdsc.nws.noaa.gov/hdsc/pfds/docs/na14v2_doc_review.pdf.

Following the peer review, the Hydrometeorological Design Studies Center (HDSC) released the final documentation for NOAA Atlas 14 Volume 2.1 on June 3rd, 2005. This comprehensive 293-page document can be downloaded as a whole or in parts via the PFDS and NOAA Atlas Documentation page at http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_docs.html. The documentation includes descriptions of the quality control and analytical procedures, descriptions of the results and how to interpret them, and tables of statistical measures and regional growth factors. It also includes temporal distributions for heavy rainfall, seasonality and trend information.

On June 15th, 2005, HDSC released the digital data used to generate all temporal distribution curves for heavy rainfall associated with NOAA Atlas 14 Volumes 1 and 2. The data are available at http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_temporal.html.

Finally, HDSC also updated the format of the digitally-available time series data. The new format (Figure 1) shows the values and dates of occurrence for the series more clearly in one file. These data are available for the annual maximum series and partial duration series used in for NOAA Atlas 14 Volumes 1 and 2 and can be downloaded through the PFDS at http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_series.html.

Figure 1. Example of new data series format.

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76 1-day, Annual Maximum, Units in Inches, region1
(011893) 07-1330 BRIDGEVILLE 1 NW , DE 38.7500 75.6167 49, ANMAX
93
3.50 07/31/1893
2.45 05/20/1894
2.25 08/16/1895
3.70 02/06/1896
-9.99 -9/-9/-999
-9.99 -9/-9/-999
5.54 07/26/1899
2.73 06/17/1900
... ..
... ..
1.63 11/29/1982
2.20 06/21/1983
4.23 05/30/1984
4.65 09/27/1985
(011903) 07-2625 DELAWARE CITY REEDY PO , DE 39.5667 75.5833 10, ANMAX
51
1.75 07/18/1903
1.83 11/13/1904
1.68 12/21/1905
2.26 08/02/1906
3.00 09/24/1907
2.90 06/15/1908

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3.2 Precipitation Frequency Data Server

The Precipitation Frequency Data Server (PFDS) - the on-line portal for all NOAA Atlas 14 deliverables and information – under went a few changes. The most significant change was on the “NOAA Atlas 14 Temporal Distributions” page, where users can now download the data (as comma-delimited files) used to plot the temporal distribution graphs in the NOAA Atlas 14 documentation (Appendix A.1). Additionally, the “NOAA Atlas 14 Version Tables” and “PFDS and NOAA Atlas 14 Documentation” pages were modified to include the release of edited final documentation for Volume 1 and final documentation for Volume 2.

HDSC continuously monitors the hits, integrity and performance of the PFDS, which continues to receive an increasing number of hits per month. The graph (Figure 2) below summarizes the number of individual data inquiries made since January 2004, while the map (Figure 3) indicates the locations of inquiries during the past quarter.

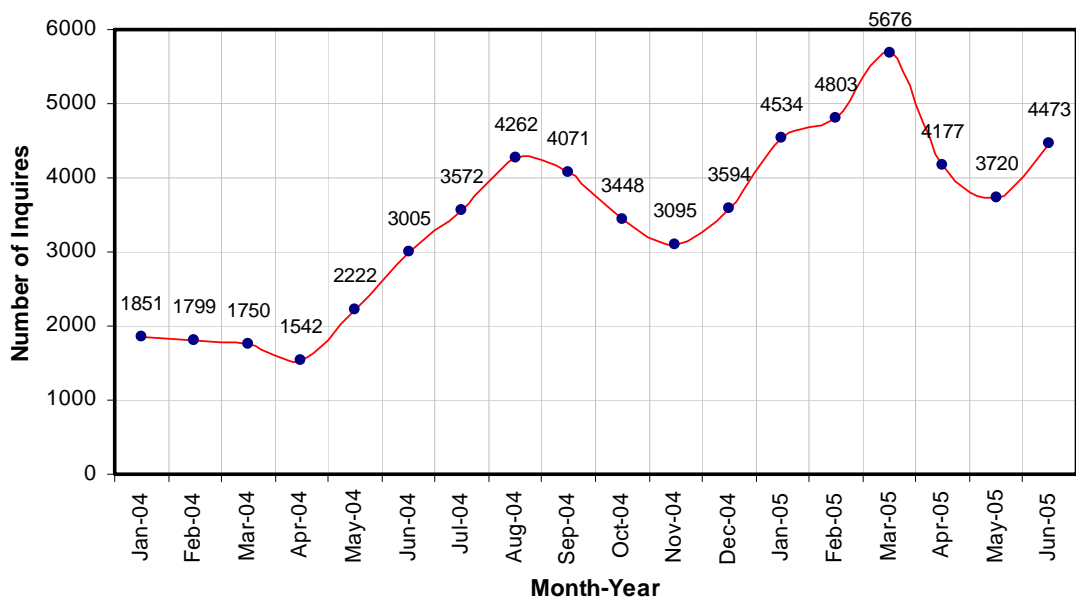


Figure 2. Number of individual PFDS data inquires per month.

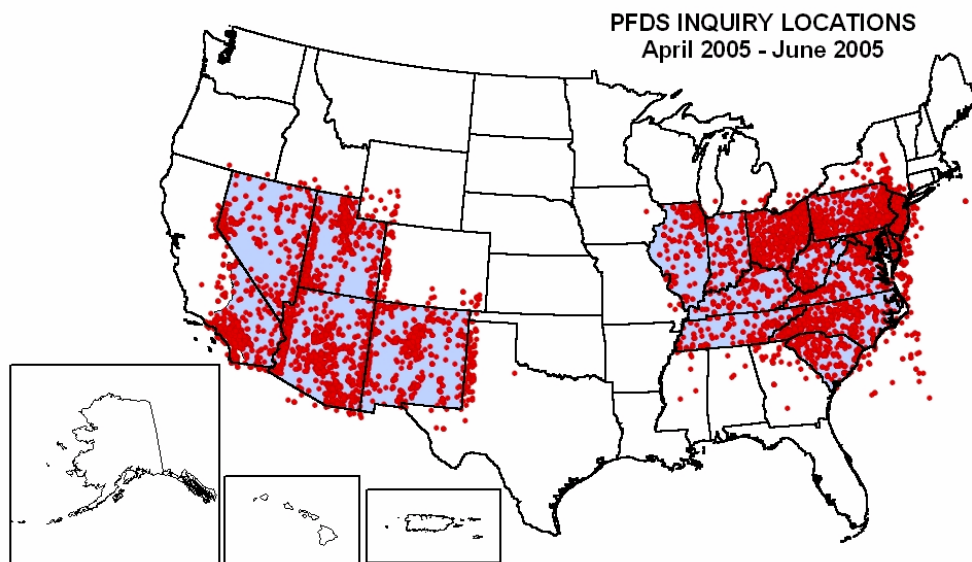


Figure 3. Map of 12,370 PFDS data inquiry locations during the period April-June 2005.

3.3 Areal Reduction Factors

Work continues in the development of geographically-fixed Areal Reduction Factor (ARF) curves for basin area sizes of 10 to 400 square miles. Progress has been slow due to difficulties in completing the software related to the addition of two durations (30-minutes and 48-hours). The use of Hydrometeorological Automated Data System (HADS) data is being investigated in order to supplement other precipitation data with the goal of possibly adding two basin sites (in the New York-New Jersey area and in Oklahoma) to the ARF study.

Two statistical and objective testing procedures, the sign test (Himmelblau, 1970) and a modified "student t" test (Siegel, 1961) will be applied to detect differences among the ARF curves at the various sites. Results of these tests on the data from two sites are being examined.

4. Issues

4.1 Recent Award

On May 13th, 2005, Geoff Bonnin, Director of HDSC, was awarded the 2005 Administrator's Award from Conrad C. Lautenbacher, Jr., Vice Admiral, U.S. Navy (Ret.), Under Secretary of Commerce for Oceans and Atmosphere for "exceptional leadership in developing climatic precipitation information for engineering design standards for the nation's construction and insurance industry." The Administrator's Award is an extremely high level of recognition within NOAA. Mr. Bonnin's honor reflects the accomplishments of entire staff during the past few years.

4.2 1-year Precipitation Frequency

HDSC has been approached by the State of Maryland State Highway Administration (MDSHA) to calculate and include the 1-year average recurrence interval (ARI) precipitation frequency estimates for NOAA Atlas 14 Volume 2. Discussions are being held with MDSHA on funding and contractual mechanisms. We anticipate that the additional estimates will be computed for the entire Volume 2 domain as it is cheaper to perform this calculation than to segregate out a calculation for Maryland alone.

5. Projected Schedule and Remaining Tasks

The following list provides a tentative schedule with completion dates. Brief descriptions of tasks being worked on next quarter are also included in this section.

Spatial Relations (Areal Reduction Factors) [September 2005]

5.1 Areal Reduction Factors (ARF)

Computations for the ARF curves will be completed for 14 areas. The resulting curves will be tested for differences to determine if a single set of ARF curves is applicable to the entire U.S. or whether curves vary by region.

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